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ABSTRACT

In this discussion of enrollment forecasting for community colleges, a new point of view is expressed. Traditional theory characterizes enrollment as a function of history. The historical approach used such methodologies as: (1) cohort, or percentage of survival, (2) curve-fitting, (3) ratio-method, and (4) correlation-analysis. However, the new perspective outlined in this discussion views enrollment as the product of demands for educational services by the student population, mediated by the operations of the college. Four major process areas are defined and discussed as appropriate to the new enrollment projection method. They are (1) definitions and formulas pertinent to the projection model, (2) outline of appropriate procedures for enrollment forecasting, (3) analysis of current enrollment context, and (4) collection and analysis of necessary institutional and demographic data. The major difficulty in implementing this new method is the quantification of the effects of various limiting and stimulating variables on enrollment. In discussing the four major process areas, an operational definition for each variable is offered and used in a step-by-step procedure illustrating the new principles. Although this treatment of enrollment forecasting is new in relationship to the historical or classical methods, it does not claim to be final or definitive. Rather, it is advanced as an alternative procedure for viewing the problem of enrollment forecasting. (Author/AL)

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COMMUNITY COLLEGE ENROLLMENT PROJECTIONS

by

Aikin Connor

JC 710 250

UNIVERSITY OF CALIF.
LOS ANGELES

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FOREWORD

In this discussion of enrollment forecasting for community colleges a new point of view is explicated. By traditional theory, enrollment has been characterized as a function of history. The perspective outlined in this discussion views enrollment as the product of demands for educational services by the population mediated by the operations of the college.

Perhaps the major difficulty raised here is the quantification of the effects of limiting and stimulating variables on enrollment. An operational definition for each variable is offered and used in a step by step procedure illustrating the new principles.

This treatment of enrollment forecasting does not claim to be final or definitive. The best hope is that a different light has been cast on the problem, and that a new perspective has been gained.

Aikin Connor

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I. PERSPECTIVES

It has become commonplace to describe community colleges as "the fastest-growing segment of higher education in America." From a total of approximately 660,000 students in 1960, enrollment in two-year colleges in the United States rose to approximately 2.5 million students in 1970.

To those in the community college movement, this growth has been heady and exhilarating. But to individual colleges, it sometimes must have seemed disconcerting, if not chaotic. Some years it has seemed that students were virtually pounding at the college doors demanding admission. As the capacity for classes has been reached without noticeably diminishing the demands for services, new facilities have been required—some temporary, some permanent.

As enrollments and demands have increased, more and more attention has necessarily been directed to planning for community colleges. Naturally, the first question voiced by planners concerned the number of students their colleges might expect to enroll over the period of the long-range plan being developed, and at any one time during that period.

The Historical Perspective

For the most part, community college planners have relied upon a well-developed and generally accepted methodology for predicting enrollments. This methodology consists of several procedures or techniques for establishing base-lines, trends, and future projections. The most commonly used (excluding certain combinations of procedures) are: (1) cohort survival, (2) curve-fitting, (3) ratio, and (4) correlation analysis (Lins, 1960). A more detailed account of these techniques is given by Lins, but a brief overview here may be helpful.

1. Cohort survival (sometimes called "Per cent survival") determines the extent to which a specified group of individuals—a cohort—survives either by grade from first grade, or by year of age from birth, through college graduation. The survival rate is then applied to predicted area population predictions to estimate the expected college enrollment.

2. Curve-fitting determines a relationship between past enrollment and years, then projects to a future date by extending the shape of the curve thus defined.

3. Ratio-method describes the ratio between the persons currently enrolled in college and the "parent" population of which they are a part. By applying this ratio to projections of future population, college enrollment is predicted.

4. Correlation-analysis seeks to establish an association (or a network of associations) between enrollment as a dependent variable and one or more independent variables. Thus, when changes are observed or predicted in the independent variables, enrollment may be predicted as a concomitant.

Is there a thread of commonality linking these methods? Does some one identifiable orientation or point of view underlie these procedures? If so, what characterizes the "established perspectives"?

Quite simply, the point of view or perspective from which these procedures stem and which is reflected in most decision making in colleges is this: The future can best be predicted by projecting the past.

In many instances, no doubt, lessons learned from history are meaningful. And in some circumstances, projection techniques of enrollment forecasting are perfectly adequate. The discussion which follows

stems from the basic assumption that to be of value to community colleges, enrollment forecasting procedures must be able to respond to the question "What if . . .?" in such a way as to give administrators reasonable grounds for making planning decisions. The college planner-administrator must be able to predict the results of planning decisions in terms of enrollment before he makes those decisions.

Thus, enrollment forecasts in community college planning not only must prompt planning decisions, they must reflect them. From this point of view the administrator becomes an active instrument in determining enrollment, not a passive spectator who merely watches events which affect student enrollment unfold, and tries to react appropriately.

The question raised here is whether the methods which reflect the established perspective offer the community college planner the possibility of answering the "What if . . .?" question. Will they allow him to assess the effect upon enrollment of a planning or policy decision?

If he relies upon cohort-survival to forecast enrollments, he cannot estimate the effect of a policy or planning decision upon enrollment because he cannot make his decision retroactive. The administrator may know that a certain percentage of high school juniors have, in the past, survived their freshman year in college, but this information is of little value when he modifies the circumstances in which that survival rate was established.

Similarly, a curve based on a relationship between years and past enrollment (e.g. growth rate) cannot take into account the effect of even the most dramatically effective planning decision upon student enrollment. Again, the administrator cannot make his decision retroactive.

The administrator who depends upon the ratio method has no way of estimating the effect of a specific decision. Enrollment projections which merely reflect changes in fixed proportion to the population cannot take into account changes that might result from an administrative action.

As long as the decision of the community college administrator causes quantifiable changes only in those variables for which associations have been established, he may be able to assess the effect of a decision upon enrollment using correlation analysis. However, he should be prepared for surprises if his decision extends the affected variables beyond their previously observed ranges. What had appeared to be a simple, straight-line relationship within a narrow range of observations may well become curvilinear when the range is extended.

Useful as some of these methods may be as descriptive tools, a new approach to the problem of estimating future enrollments seems to be needed.

The New Perspective

In order to avoid misunderstandings about the analogy used here of "perspective" a word of explanation may be called for. Perspective is meant to imply that the frame of reference, model, set of assumptions, etc., represent a consistent way of viewing enrollment predictions. Traditionally, this view or perspective has been that enrollment is a function of history: that future enrollments may be predicted by carefully analyzing past enrollments and applying a "formula"; in short, that the future can best be predicted by projecting the past.

A new perspective, then, means only that a different point of view is developed. The new perspective does not deny that the future can best be predicted by projecting the past; neither does it confirm it. The new perspective is a different way of looking at enrollment prediction, a different conceptualization of the problem.

The new perspective that will be developed here sees enrollment not as a function of the past but in terms of a continuous present. Enrollment is characterized as a measure of educational demand mediated by the college's response to that demand. Thus, total enrollment is the sum of individual enrollees, each of whom is enrolled because his personal demand was responded to by the college. Forecasting college enrollment is viewed as a problem of estimating the interaction of two factors or forces: demand for educational services, and institutional limitations on meeting the demand.

Perhaps the most compelling argument favoring the new perspective is that the assumptions of the model hold for the individual enrollee as well as for the total enrollment; that the analytical procedures followed to forecast total enrollment may be applied to any individual enrollee.

As a simplified illustration, consider an individual case. A person is motivated (or not) to learn, become educated, acquire a skill or skills, or gain status and credentials. He becomes counted in enrollment data if: (a) he is sufficiently motivated and (b) the college responds positively to meet his educational needs or demands. He is not counted in enrollment data if: (a) he is not sufficiently motivated, or (b) if the college does not respond positively to meet his educational needs or demands.

The total enrollment of a college at any time, then, represents a measure of positive response to the educational needs or demands of its community. Predicting enrollment, from this point of view, depends upon accurately estimating the force of educational demands in the community served and assessing the effects of institutional responses to those demands. The first requires foresight; the second, understanding.

II. THE GENERAL CONTEXT

In the previous section, as well as in most discussions of the problem, these terms are used: forecasting, prediction, and projection. For the sake of clarity, the following distinctions will be made in this discussion.

"Forecast" means a general description of what is anticipated. Just as a weather forecast may be made over a period of time which describes atmospheric conditions expected as a result of various observable forces of low and high pressure systems, moving and stationary fronts, etc., an enrollment forecast should describe potential events and interaction of events which will affect enrollment.

When the time-span is shortened to a specific point and conditions which will prevail are specified, a "prediction" is made. Tomorrow's weather is predicted to be fair and cool because a high pressure system preceded by a cold front is expected to move into the area by tomorrow. Next year's enrollment is predicted to increase by so many students because a new industry is moving into the area which will require skills and vocational interests not previously demanded and the college is preparing to respond to the anticipated need.

The term "projection" is used here to describe processes of extending the past into the future. A trend is established by observations of events, such as a year-by-year increase in the purchase of compact cars. Based on this observed trend, automobile manufacturers may project a specific volume of sales of compact cars for the next five years. Based on similar trends in enrollment figures, college administrators may project specific numbers of students over the next five years.

To continue the analogy of the auto manufacturer, he makes his predictions of sales of compact cars so that he can plan for the necessary re-tooling, redesigning, hiring of personnel, and advertising to meet the demands he has predicted. The college administrator does the same.

Because college facilities cannot be constructed overnight, the process of facility-planning is a continuing one. The administrator must know not only the condition of the current facilities and their "life expectancy" but he must look forward to specific demands upon the college facilities in the future.

In the context of a rapidly changing work world, program planning has become an urgent need. Not only must the college administrator seek to meet the changing occupational demands of his constituency, he must be able to foresee how the introduction of new programs and the phasing out of unnecessary ones will affect the enrollment in those that continue.

Enrollment forecasts are vital to the planning for staff, facilities, and program. Sheer numbers of students exert demands on faculty, administrative staff, counselors, librarians, custodial personnel, and other staff required to support the operation of the college and the campus. The magnitude of those numbers must be predicted well in advance in order to avoid institutional chaos and administrative trauma.

Enrollment forecasting assumes different contexts, depending upon the objectives, goals, and operational mode of the college. In general, two-year colleges in the U.S. are classified as private or public, depending upon their governing and supporting agencies.

Privately controlled colleges may be proprietary schools, such as the many business and technical schools operated by an individual or a profit-making company. Such schools forecast enrollment much as a factory must forecast production—in terms of meeting a demand it has fostered and encouraged. Like the factory, the proprietary school will do its utmost to satisfy the predicted demands.

Other privately controlled colleges are operated by independent, non-profit organizations. These colleges need to make enrollment forecasts, too, but in many instances, the purpose is to allow the administrator adequate lead-time to recruit students (if a decrease is predicted) or secure funds (if an increase is predicted).

Church-related colleges utilize enrollment forecasting in the same way independent, non-proprietary schools use them. Long-term plans and policy decisions require an estimate of expected enrollments. In particular, changes in admission policies must take into account their effect on future enrollment.

The great majority of students who are enrolled in two-year colleges are enrolled in publicly supported colleges. These may offer occupational curricula, academic transfer curricula, community services, and continuing education, as well as virtually all combinations of these programs. The administrator of a public college must be as ready to meet the educational demands of his constituency as is the proprietary school administrator. He must be as sensitive to the effect of policy decisions on enrollment as the private

college administrator is. In short, the community college administrator must grasp the reasons underlying student enrollment in order to make significant enrollment forecasts.

Perhaps the greatest problem in forecasting enrollment in community colleges results from the undefined student population they serve. Unlike universities whose students are drawn almost exclusively from the ranks of the so-called "college-age population," community colleges serve not only the college-age population but a substantial segment of the "post college-age" population, as well. Forecasting procedures which rely upon statistics derived from the limited college-age population are likely to produce errors of considerable magnitude when they are used in community colleges.

Definition of Enrollment

Probably no college administrator views his institution as a monolithic establishment. He is more likely to think of it as an inter-related collection of educational services—a functional identity rather than a formal one. His budget requirements reflect the aggregate needs of all the service functions of the college both internal and external. If he is committed to a "PPBS" approach he is made constantly aware of the diverse nature of his institution's identity.

The college administrator is also aware that the total enrollment of his college represents an aggregation of the enrollments for each sector of college activity. In other words, college enrollment is the sum of the enrollment of liberal arts transfer students, science transfer students, allied health career students, automotive technology career students, electronic technology career students, part-time non-credit students, etc. Those factors which affect enrollment in one segment of the college may have no effect, or only tangential effect, on another segment. The significance of this fact for enrollment forecasting is crucial.

Using the old perspective, this diversity of function (based on diversity of educational need) would suggest different projection methods. It is safe to say, for example, that the bulk of students in transfer programs are: (1) recent high school graduates or, (2) under 25 years old. This segment of the enrollment has proved to be the most stable, its ratio-to-population most nearly unchanging of any group of enrollees. Therefore, a fairly accurate prediction might result from the use of the ratio method of projection.

In another case, career enrollment is very likely to be associated with certain employment variables, suggesting correlation analysis as a projection method for this segment of the enrollment. In short, if one is to project future enrollment the method or methods employed should be those which most efficiently use the information available.

When enrollment figures are issued for a college they may be: (1) headcount—current registration, (2) headcount—cumulative for the academic year, (3) full-time equivalent—current registration, or (4) full-time equivalent—cumulative for the academic year. The type of enrollment figure employed depends upon (in some cases) legal requirements in definitions or the use to be made of the data. A brief discussion of each type may clarify terminology.

Headcount enrollment means simply counting all registered students, full-time and part-time. In some instances colleges count only degree-credit students; in other instances all registered students are counted. The definition or determination of who is a "student" and who is not raises problems in dealing with community college enrollment data. Some colleges offer many short-term non-credit courses but do not count registrants in these courses as enrollees; other colleges include them. Sometimes they are counted for one purpose but not another, giving the college enrollment picture a thoroughly unreliable and inaccurate appearance. Any enrollment forecast, then, must be made in terms consistent with itself.

Full-time equivalent enrollment is determined by a mathematical formula applied to headcount figures. The formula varies from locale to locale and almost always reflects state regulations. In turn, the state regulations reflect varying requirements. The American Association of Junior Colleges, for example, utilizes a formula for FTE of full-time plus three-quarters part-time to establish institutional membership dues.

Current registration or sometimes "opening fall enrollment" is a count (whether headcount or FTE) of students enrolled at a specific date. Since the "academic year" begins with the fall term (quarter or semester) usually enrollment figures are based upon registration at some point during the fall session. This date may be the final date for registration in the session, the last day to drop classes without penalty, or an arbitrary date early in the session.

Cumulative enrollment ordinarily means the total number of enrollees (headcount or FTE) who have been in college during the academic year—fall and spring semesters or fall, winter, and spring quarters. However, practices are not standard here, either. For example, some schools accumulate enrollment beginning with the first session of a calendar year—the spring semester or winter quarter. Also, some schools include summer sessions and some do not. Again, enrollment forecasting must use definitions which are at least internally consistent.

From the foregoing discussion it is obvious that enrollment forecasting must concern itself both with disaggregation of total enrollment and consistency in defining enrollment and its elements—students.

III. A CONCEPTUAL FRAMEWORK

From the proposed new perspective, enrollment in community colleges is conceived as a quantification of the demand for educational services mitigated by the ability of the community college to provide those services. This suggests two factors that an enrollment forecast must deal with: (1) those factors which stimulate demand, and (2) those factors which limit the satisfaction of demand. Although both of these factors will be more thoroughly discussed later, a simple example will be useful here.

One factor that stimulates demand for community college services is the opportunity for employment of college graduates. A factor which limits the satisfaction of that demand by the community college is staff. For example, if a specific occupational program carries virtually certain employment as a reward for its completion but the college employs only one staff member for that program, enrollment will be limited to that number which the single staff member can accommodate. On the other hand, no matter how many instructors the college may have available for, say, widget technology, if there is no market for widget technicians, it seems unlikely that enrollment will be heavy.

Limiting Factors

While idly observing the flow of automobile traffic on the street below an office window, if one were to see the cars on the street suddenly start up and move when a green light appeared, one might well infer a causal relationship. The sudden appearance of the green light might appear to cause or stimulate the movement of traffic.

Although we know that green lights do not stimulate the flow of traffic, they merely allow traffic to move, we do not always recognize a similar situation in the operation of colleges. We are sometimes led to conclude that because enrollment increases follow a liberalization of admission policies, there is a causal relationship to be inferred. However, just as the green traffic light merely allows the movement of automobiles, liberalizing admission policies simply allows enrollment to increase. It is important to realize that the traffic will move on a green light only if there is traffic; and enrollment increases will follow liberalized admissions only if there is a commensurate demand for admission. To get a clearer picture of the many ways in which colleges limit the satisfaction of educational demands, let us consider a few specific examples.

Admission policies. Many institutions boast that they maintain an "open door" admissions policy, allowing any high school graduate to enroll. However, the "door" is closed to everyone who has not graduated from high school (or passed an equivalency exam). The would-be student who dropped out of high school before graduation must return to school or pass an equivalency exam before the college will respond to his educational demands. Other community colleges, such as those in California, allow any high school graduate of any age, or any adult over 18 years of age who can benefit from college, to enroll. The high school junior, aged 16 or 17, who could easily profit from college work may be excluded. The college will not respond to his education demands. Those colleges which require a specific high school grade-point average or a minimum score on a standardized test deliberately choose not to respond to the educational needs of those potential students who do not meet these criteria.

Facilities. Enrollments are limited by the size, kind, and location of facilities. How many students will existing facilities accommodate? What kind of programs or curricula are dictated by available facilities? How proximate are the college's facilities to its clientele? If existing facilities can accommodate 1,000

students, either facilities must be expanded or enrollment must be limited to 1,000. If the facilities are located three miles from town, enrollment is limited to those who can arrange for time and transportation to classes.

Program. Enrollments are possible only in existing programs or curricula. A college that restricts its curriculum to transfer programs will limit its enrollment to those whose educational needs can be thus accommodated. Conversely, a college that offers only vocational and occupational programs will enroll none whose career or educational needs require completion of a four-year curriculum.

Staff. No matter how liberal a school's admissions policies are, how large and well-located its college facilities and no matter how extensive its curricular offerings, enrollment will be limited by the size, quality, and style of the staff. The most obvious limitation is size. While faculty-student ratios vary from program to program, in all programs there are limits beyond which the faculty-student ratio cannot be stretched.

Less obvious but frequently more important is the limitation brought on by low-quality faculty. The community college, like most public institutions, develops a kind of image by which it is known and evaluated. When this image includes a poorly qualified faculty, student demand will be low.

The style of the staff is the most elusive of all limitations. No matter how large nor how well qualified the staff may be, students respond immediately to its style. If that style is too reminiscent of high school teachers, successful high school students are often repelled. Even in colleges where unsuccessful high school students are admitted, faculty style may exert a severely limiting effect.

Stimulating Factors

Distinguishing between stimulating and limiting variables is sometimes difficult; recognizing stimulating factors is no easier. Just as a limiting variable is not functional unless it actually does limit the satisfaction of a demand (if there is no traffic, the traffic light does not have any effect), a stimulating factor is not functional unless it actually stimulates educational demand.

There are at least three reasons why recognition of a stimulating variable can be a problem. One is the fact that students (or would-be students) respond differently to the same stimulus. The draft law exempting students stimulated many "new" students to enroll who would probably not otherwise have considered college. But it only stimulated demands from males of draft age.

A second cause of difficulty is that stimulation is often peculiar to a situation. Occupational requirements of a specific community may stimulate enrollment in the local community college in programs designed to train for the needed occupations. Those same programs, however, would probably not stimulate enrollment if occupational needs were different.

Third, and most important, no matter how stimulating an event or events may be potentially, if a limiting condition stands squarely in the path of satisfaction of the demand stimulated, no enrollment increase (and therefore no stimulation) will be noted. In a college with stringently limiting admission policies and operating at capacity, even so strong a stimulant as the draft law exempting students would be unlikely to have a noticeable effect.

When considering factors that could stimulate educational demands it might be well to divide the general category into two specific sub-categories. One of these sub-categories would contain those factors which derive from local or regional events, or forces; the other would include those which arise out of national or international events or forces. Again, a few specific examples may clarify the concept.

Local Stimulating Factors. One type of stimulating factor deriving from a local event might be the development of a new local industry which promises employment to college graduates. While it is true that many of those who would pursue a training course required by the new industry might already be enrolled in some less promising program, the likelihood of employment would stimulate demands from those not enrolled.

A second situation stimulating educational demand is one which increases the target population or potential clientele of the college. Examples of this kind of event are commonplace, the opening of a military base being a striking one. Not only does such an event create a new clientele, it alters the characteristics of the community and the educational demands to which the college must respond.

National Stimulating Factors. A perfect example of a stimulating factor deriving from a national event has been mentioned previously: the draft law which exempted students. It is safe to say that no college was

untouched by this event (although some may not have responded to the increased demands it stimulated). It remains to be seen whether the stimulation created by the exemption of students from the draft made a lasting and permanent change in terms of educational expectations.

Administrative Control

From the foregoing examples of factors stimulating and limiting college enrollment it is evident that many times the college administrator has little control. Because of varying degrees of autonomy or local authority among colleges it is difficult to make general statements regarding administrative control. However, examples of controls which, at least in some colleges, may be exerted will give direction to the college administrator who is familiar with the constraints of his own situation.

The administration of Wilson College is committed to the philosophical view that the community college should serve the educational needs of individuals within its community. The president recognizes that some high school students are very well prepared for college studies before their graduation from high school. In fact, some students with high academic potential may get "turned off" to school if their need for more challenging coursework is not met.

With this in mind, the college administrator seeks to remove limitations which keep potential students from college enrollment. First, he finds that state law restricts enrollment to those who have completed high school (or its equivalent) or are 18 years or older. However, he finds nothing in the state law which restricts class attendance to those who are properly enrolled—that kind of regulation is local and subject to his modification. Although he cannot offer regular college credit to those potential students who may choose to attend college classes, he can arrange for credit-by-examination for them when they become eligible for regular enrollment. By using the authority he had, this president effectively removed or modified a limitation on his institution's response to an educational need in the community.

The administration of Wilson College also recognized another educational demand from its community. Among the high schools in the area, Wilson College serves one school which was traditionally noted for the high level of attainment of its "vocational education" graduates. Yet few of those graduates enrolled in college, even though many programs were offered which could become careers. One look at a map of the community convinced the president of Wilson College that the location of the college facilities severely limited enrollment of students from that high school. By leasing the necessary facilities from the high school and arranging efficient transportation from that area of the community to the main college campus he effectively removed a very real limitation to enrollment from an important segment of the college's community.

Realizing that many potential students were not sufficiently motivated to enroll in Wilson College, the administration hypothesized that the college was not "communicating" with this segment of its community. To stimulate enrollment of these students, a campaign of counseling visitations to local high schools and shopping centers was mounted. The increased visibility of the college in this sector of the community stimulated a demand for college services.

These examples could be multiplied many times over, but perhaps these few will suggest ways in which administrative action can effect or control factors relating to college enrollment.

Summary

The conceptual framework developed above results from what was termed earlier as the new perspective. College enrollment reflects the action and interaction of stimulating and limiting forces. Some of these forces stem from local situations and may be subject to control by the college administrator. Other forces are derived from national (or state) situations or events and are probably not subject to manipulation by the college administrator.

It is obvious, of course, that the proposed conceptualization does not immediately solve all the problems of enrollment forecasting for the community college. For example, nothing is said about specific procedures for collecting and analyzing data. But the problems of enrollment forecasting are specific to the situation, and ultimately must be solved within a given context. Data collection and analysis are dictated by the requirements of a specific situation. The purpose of this conceptualization and, indeed, of the new perspective is not to solve all the problems of enrollment projection in community colleges but to provide a framework for developing appropriate data collection and analysis procedures by defining the context in which enrollment forecasting must operate and the nature of the critical factors involved.

IV QUANTIFICATION

Perhaps the appeal of the old perspective for enrollment forecasters is that it presents few problems of quantification. When it uses data those data are "hard" and numeric. A certain percentage of students "survive" from high school to college, a proportion of a population attends college, a tendency of enrollment to increase is noted in numerical terms, etc.

The difficulty presented by the new perspective to the enrollment forecaster is that quantification is not ready-made. The survival rate of students, the proportion of a population attending college, and the trend of enrollment all mean nothing in the new perspective unless the forces or factors which produced the enrollment history are constant or changing at a specifiable rate. That these assumptions are often inappropriate for community college planners may be illustrated by the following excerpt from an enrollment forecast.

> In projecting future populations and enrollments, it was assumed that those factors currently in operation will, for the most part, remain constant except for such factors as birth rates and educational opportunity.
>
> The assumptions used for projection purposes include the following:
>
> 1. The present decline in birth rates will continue until 1970 when the rate will stabilize.
>
> 2. In and out-migration will remain stable for Minnesota.
>
> 3. Mortality rates will remain constant.
>
> 4. The prime post-secondary education group will continue to be the 18-21 year old group.
>
> 5. There will be no major changes in instructional patterns and in ways of earning degrees or pursuing further education.
>
> 6. There will be no major changes in requirements for admissions to post-secondary institutions.
>
> 7. The post-secondary education attendance rate will increase as progress continues in making appropriate programs of post-secondary education more accessible and in providing necessary assistance and encouragement for high school graduates to pursue additional education. (Minnesota, p. 52)

Another enrollment forecast requires another set of assumptions.

> (1) It was assumed that the number of freshmen entering colleges or universities in the fall of 1967 would equal 68 per cent of the 1967 high school graduates and that this per cent would increase 2 per cent per year. The private colleges are assumed to get 10 per cent of the graduates, the public four-year colleges [illegible] per cent, and the public two-year colleges the remainder.
>
> (2) The net attrition rate between the two years was assumed to be 50 per cent.
>
> . . . Another assumption is that there will be no major wars, recessions, depressions, major reductions in public support for higher education, or other major variations. [Enrollment projections] are also dependent upon policy decisions by the federal, state, and local governments, the higher education institutions and others. (Campbell, pp. 79, 80)

Each year the National Center for Educational Statistics of the U.S. Office of Education issues enrollment projections. A sample of the assumptions from which such projections proceed may be seen in the following quotation:

> The projection of total opening fall degree-credit enrollment in two-year institutions . . . is based on the assumption that total enrollment, expressed as a percentage of population aged 18-21 years, will follow the 1956-66 trend to 1976 . . . (Simon and Fullam, p. 17)

If the forecaster is prepared to live with such assumptions, his data are readily available and quantified. If, however, he proceeds from the new perspective he cannot accept such assumptions and must find means of measuring or quantifying data relevant to the interactive forces of stimulation and limitation.

Quantifying Limiting Factors. To arrive at a measure of the effect of a limiting factor, one assumption will be made: The entire population would be enrolled if there were no limiting factors. The corollary to this is, of course, that the effect of a limiting factor is exactly commensurate with the number of people it prohibits. Whether or not the people it does not prohibit from enrolling would actually enroll is the concern of the stimulating factors.

The following simplified example illustrates the measure of the effects of limiting factors.

The Context. Pratt College is located three miles outside the city of Pratt. It accepts students who have completed high school or who have passed an equivalency exam. It offers liberal arts transfer courses, a professional nursing program, and an electronic technology program. All students must be enrolled in one of these programs, which are offered only from 8:00 a.m. to 5:00 p.m. There is no public transportation or school-provided transportation to the campus where all classes are held. Tuition is free for residents of the district, $700 per semester for all others.

Effects of Limitations. Although the college accepts qualified students from anywhere in the world it effectively limits enrollment to residents of the district, partly because of its location, partly because of discriminatory tuition. The total population of the district is 200,000 people.

By accepting only graduates of high school or its equivalent, Pratt College effectively limits enrollment (with an occasional exception) to those people in the district over age 17-about 100,000. Since school attendance is compulsory only to age 16, approximately 30 per cent of those native to the area have not completed high school, leaving 70,000. Of the 30,000 nongraduates, 5 per cent have passed an equivalency exam, adding 1,500 potential students, yielding 71,500 potential students.

Because of the hours classes are held, virtually all working adults in the community are unable to attend. These working adults represent approximately 54 per cent of the population over 17 years old. Assuming that this figure of 54 per cent is true for the 71,500 potential students described above, as well as for the total adult population, this limitation brings the total potential student population to 32,890.

Of the 32,890 potential students remaining, 30 per cent are from a lower income area of the city of Pratt and are unable to provide themselves with transportation. This limitation reduces the potential student body to 23,023.

The effect of college curricular offerings is difficult to categorize as limiting or stimulating. To some students, the nursing program at Pratt College may well represent an incentive to enroll in college. To others, the lack of, say, an environmental science program represents a limitation. Recognizing this ambiguity as virtually unresolvable, we may assign stimulating effect to programs offered in the college curriculum and assume that some portion of the potential student body is restrained from enrollment by a lack of appropriate programs.

The observed effect of recognizable limiting factors at Pratt was to reduce the potential student body from the total population of the district—200,000—to an effective potential of 23,023. The magnitude of the force of limiting factors may be estimated by noting that 88.5 per cent of the citizenry in the district supporting Pratt are effectively restricted from utilizing its services.

Quantifying Stimulating Factors

After having identified and quantified the effect of limiting factors on the enrollment at Pratt College the quantification of stimulating factors is very simple in terms of aggregate effect. From a potential enrollment (after limitations) of 23,023 Pratt College actually enrolls 1,151 students, or 5 per cent. Clearly, not everyone who was regarded as a potential student, in fact, became a student.

So far, the quantification of variables in terms of the new perspective has not been exceptionally difficult, nor has it required extensive data collection. However, the ambiguities with which the college administrator is familiar become quite troublesome at this stage of the enrollment analysis. Do the 21,872 potential students who are not enrolled represent lack of force in the stimulating factors operating in the situation? Or do these potential students represent discrepancies in the estimation of the effect of limiting factors (i.e. are they actually excluded by some unspecified limiting factor)?

V. ENROLLMENT FORECASTING: NEW PERSPECTIVE

Before proceeding with a discussion of forecasting procedures appropriate to the new perspective, the key terms in the premise must be defined operationally.

Definitions and Formula

1. Enrollment—head count of students registered.
2. Educational demands—the aggregate effect of stimulating factors operative upon the population served; measured by the proportion of potential students actually enrolled.
3. Population served—may be entire population of region or district, or any sub-group thereof.
4. Institutional response—effect of limiting factors; measured by the proportion of population not excluded by limiting factors.

Stated as a formula: A=B (1.0 - C) X D when:

A=enrollment

B=population (any group from which enrollees are drawn)

C=limitation (the proportion of that population which is effectively excluded)

D=stimulation (the proportion of the potential students actually enrolled).

Outline of Procedures

The procedures to be followed for enrollment forecasting will require the following steps:

1. Identify functional segments of the college enrollment (e.g. "transfer" students).
2. For each segment specified in #1, identify parent population (e.g. "transfer students drawn from 18-24 high school graduates").
3. Determine proportion of population (from #2) excluded by limiting factors currently operating (e.g. 30 per cent excluded because campus facility beyond practical commuting distance). Compute the product of the proportion of the population which was not excluded (1.0-.30=.70) and the population (defined in #2).
4. Compute the ratio of students enrolled to potential students as the aggregate effect of stimulating factors currently operating.
5. Identify areas of administrative control (e.g. removal of limitations by administrative action).
6. Identify future events or conditions which may effectively stimulate or limit enrollment (e.g. end of student deferments).
7. Determine options for administration action (e.g. recruitment of returning ex-servicemen).
8. Compute enrollment forecast in terms of anticipated future conditions.
9. Repeat #1-8 for each segment of college enrollment identified. Aggregate enrollment forecast is a summation of individually forecasted enrollment segments.

It may be apparent from the above steps, that the procedure may be seen as three major phases: analysis of current enrollment and forces and/or conditions which have produced it; analysis of future events which may affect enrollment; analysis of consequences of anticipated future forces and administrative action. The collection, analysis, and interpretation of data is a part of each phase and will be discussed in a subsequent section. The following discussion will treat each of these phases and procedures in some detail.

Analysis of Current Enrollment Context

The enrollment forecast in light of the new perspective reflects the answer to the question. "Of the parameters that define the local context of college enrollment, which will be likely to change during the period of the forecast, and how much?" The first phase, then, is to establish parameter values which define the current enrollment context.

1. *Identify functional segments of the college enrollment.* The need for dis-aggregating enrollment was discussed in Chapter II. Because factors exert variable force on different segments of the college enrollment it is necessary to identify enrollment segments which are functionally different. The specific

identity of these segments depends upon local conditions, but illustrative examples might be the segments represented by transfer students, career students, and non-degree students. These segments would function quite differently in response to a change in transfer requirements, occupational outlook, and class schedules.

If changes were made in the number of credits and specific courses necessary to transfer to a four-year institution, transfer students would be required to make appropriate responses, possibly resulting in the abandonment of the transfer program.

If a career area, such as allied health occupations, were to become overcrowded, many students in career programs related to such occupations would undoubtedly turn to other careers.

If courses of general interest to the non-degree student, such as "Law for Laymen," for example, were to be scheduled at 9:00 a.m., it would seem likely that attendance and enrollment would plummet.

2. *For each segment specified, identify the parent population.* Once more, the specific solution depends upon local circumstances. However, illustrative examples may help to clarify the demands of this task.

Arden College has 1,000 students enrolled in various transfer programs. These students are virtually all in the age group 18-24 and have completed high school. Eighty per cent are graduates of Near High School and 20 per cent are graduates of Far High School. The total population of 18-24 year olds in the district is 100,000, of which 40,000 live in the area of Near High School and 60,000 live in the area of Far High School. This total parent population of transfer students may be treated as one population of 100,000 or two populations of 40,000 and 60,000 respectively.

At Arden College, students in career programs are virtually all in the 18-24 age group. They are also high school graduates, with approximately 80 per cent from Far High School and 20 per cent from Near High School. This group also may be divided into subpopulations of 40,000 and 60,000, to reflect high school background and/or residence.

The non-degree students at Arden College are drawn almost exclusively from the 25-50 age group. In the community there are approximately 50,000 in this age group.

3. *Determine proportion of population (defined above) excluded by limiting factors.* (Note: For the sake of simplicity, the remaining steps will be concerned only with the segment of Arden College's enrollment identified as career students.)

In the district served by Arden College the total population in the age group 18-24 from which career students are drawn is 100,000. However, the admission policy of the college requires high school graduation or an equivalent certificate. Since 30 per cent of the population in this age group did not finish high school or take an equivalency exam, they are excluded from enrolling.

Because the college campus is located three miles outside the city and no public transportation is available, approximately 40 per cent of the 70,000 high school graduates ages 18-24 are effectively excluded by not having their own cars.

Of the 42,000 population remaining, nearly 50 per cent must hold full-time jobs during the day. Because the college does not schedule career-oriented classes at night, an estimated 21,000 potential students are excluded.

Other limitations imposed by the staff and the program are difficult, if not impossible, to quantify. For the sake of simplicity, only those limitations indicated above will be considered in the example. By measuring the effect of limiting factors in terms of the proportion of the target population excluded, the number of potential students remaining is 21,000—79 per cent having been excluded.

4. *Compute the ratio of students enrolled to potential students as the aggregate effect of stimulating factors.* Of the 21,000 potential students identified by the two previous steps, 1,050 are currently enrolled in Arden College career programs. The proportion 1,050:21,000 or .05 is the estimated aggregate strength of stimulating factors operating in the situation.

Because career program students are usually goal-oriented, the prospect of employment is unquestionably a major stimulant to their enrollment. Other factors might include parental pressures and peer influence. In general, it may be assumed that students are motivated to enroll in college: (1) because they like to go to school, (2) to learn a specific skill or trade, (3) because they are vitally interested in learning a particular subject or area, (4) to achieve status and/or credentials, (5) because alternatives to college are less favored, or (6) a combination of several reasons.

As a means of estimating the effective force of these reasons in a particular student body, a simple survey might be made. The results of such a survey should give hints about the effects of anticipated future events. The total strength of the stimulating factors currently operating, however, is measured by the proportion of potential students currently enrolled. In the example, this figure is .05.

5. *Identify areas of administrative control.* The point was made previously that the college administrator can exert some control over both limiting and stimulating factors. In the present example three important limiting factors were identified: admission requirements, campus location, and class scheduling. The requirement of a high school diploma for admission is

probably not subject to the discretion of the local administrator, although it is possible for potential students to be encouraged through availability of appropriate classes to become eligible through an equivalency exam.

The second limitation noted--campus location—is subject to change instigated by the administrator. While it is true that the removal of the campus to a more convenient location is beyond the bounds of executive action, the administrator can effectively remove the limitation in two ways. Campus extension centers can be established in out-of-reach areas of the district and, college-supported transportation can be made available to bring students from far points.

The limitation easiest for the administrator to remove can be done by the scheduling of classes for career programs during the evening and night. This will help the would-be student who must be employed full-time during the day.

In the area of stimulating factors, the college administrator probably has most effective control over program offerings. Assuming, in our example of career students, that the principal motivation for the students being enrolled in college is to learn a specific skill or trade, the administrator may increase the force of that stimulation factor by expanding the career program curriculum. Although every administrator undoubtedly is familiar with the phenomenon of expanding curricula and stable enrollment (students merely shift to another program), that phenomenon may well be attributable to lack of public communication, continuance of limitations, or several other factors.

It may be noted that administrative options or courses of action like limiting and stimulating factors are related to local conditions. The alert and astute administrator will have little difficulty identifying his own areas of effective action.

6. *Identify future events or conditions which may effectively stimulate or limit enrollment.* The second major phase of enrollment forecasting is one which is subject to greatest error. Even highly-acclaimed seers and prophets are often wrong. However, in recent years much attention has been given to forecasting the future, and techniques for reducing the margin of error in speculation have been developed. Perhaps the most widely used and best known of these newly developed techniques is known as Delphi.

Although numerous adaptations of the basic Delphi technique have been developed for specific applications, all follow similar procedures in gathering data. The basic Delphi procedure is: (1) to identify individuals to participate who meet some set of criteria, such as technical expertise, social power, etc.; (2) to allow each participant to respond in a relatively unstructured manner to questions of the future; (3) as a result of responses to these questions (Round I), to develop more specific structure to questionnaire for Round II; (4) continue to refine responses, round by round, until some pre-determined goal is reached. (This goal varies and is the cause of variant procedures.)

An example of Delphi procedures applied to educational planning in two-year colleges is a study called "Focus Delphi." Focus Delphi was conducted during the academic year 1969-70 by Delayne R. Hudspeth and others for the New York State Education Department's Bureau of Two-Year College Programs.

Although the traditional Delphi study deliberately attempts to elicit consensus, the purpose of Focus Delphi was to discover where, within the social system affecting the two-year college, consensus exists. By selecting participants on the basis of role-function in the system, Focus Delphi sought to delineate areas of agreement and areas of conflict among the participants.

"Knowledge of the differences of opinion held by those who serve different roles within a system becomes valuable planning data for the policy maker in that it suggests one strategy for an event having high probability of occurrence (all sectors having agreed as to when an event might occur and to its potential value) and another strategy for an event where one or more sectors clearly disagree." (Hudspeth, p. 2)

After the participants in the Focus Delphi study were identified, each was sent a questionnaire designed "to elicit from each respondent 10 events that he considered as plausable occurrences for the future." (Hudspeth, p. 7)

When all questionnaires were returned, the events described were collated in terms of similarity, and edited. Events which would enter into further rounds were chosen on the basis of pre-determined criteria of frequency, emphasis, interest, and impact on electro-mechanical technology and education (the subject of the study).

The second round of Focus Delphi elicited from the participants estimated dates of occurrence for each event. Participants were asked to restrict their estimates to the period of the next 15 years, with options of conjecturing that the event would occur "later" or "never," as well. Two dates were requested: the earliest possible date and the most likely date.

Round III sought to refine the estimated date by allowing respondents to change their estimates in light of other estimates. Also, Round III elicited value statements regarding the individual and society as a whole, with regard to the effect of each event.

The fourth and final round of Focus Delphi reported back to the respondents the results of previous rounds, and elicited further information on 20 events, chosen with regard to their positive or negative value for society and their probability (or lack) of occurrence at a narrowly specified time. Information gathered in

Round IV included participants' perceptions of the "power group" related to each event's occurrence and the strategy the individual, as a member of his own group, would follow with regard to each event's occurrence.

Although this simple description of Focus Delphi indicates nothing about the conclusions of the study, it may, perhaps, serve to illustrate a procedure which the college administrator might adapt to his own forecasting needs. By choosing participants judiciously and directing their attention to the impact of events on the college, he can describe the future with some precision and, hopefully, with some accuracy.

7. *Determine options for administrative action.* After developing a "scenario" for the future of the college with the help of Delphi or other techniques, the administrator must make an analysis of his alternatives or options. The consequences of exercising those options may be quantified in terms of their effects upon enrollment. Consideration of the constraints of budgets, etc., may make certain decisions inevitable.

8. *Compute enrollment forecast in terms of anticipated future conditions.* Having analyzed the current structure of circumstances, or the context in which his college functions, and having forecasted its future context (including the impact of administrative decisions), the administrator can now compute the anticipated enrollment in the segment of the college for which the analysis was made. In the formula Enrollment=Population × Effect of Limiting Factors × Effect of Stimulating Factors, he can substitute estimated values.

9. *Repeat for each segment of college enrollment identified.* The sum or aggregate enrollment figures will be derived by adding all segment forecasts.

Data

The data for enrollment forecasting following the procedures outlined above are no more extensive than those required for enrollment projection procedures. In either case, both institutional and demographic data are required.

Institutional data are those associated with the institution—enrollment history, enrollment by program, admission policies, faculty employed, etc. Demographic data are those related to the population of the district-residential locations, population density, transportation facilities, employment data, etc.

The source of institutional data is, of course, the college itself. All the information required is collected by the college and is usually fairly accessible.

Demographic data have several possible sources. Basic information about the population, such as population maps denoting residential, commercial, or industrial areas, socio-economic conditions within certain areas, can usually be found in the city or regional planning office, or may be obtained from the zoning commission. Manpower studies by the U.S. Department of Labor, economic studies by the U.S. Office of Economic Opportunity, school census, diennial Federal Census, high school records—all are sources of information about the community in which the college operates.

In the main, the problem for the college administrator is not finding data but using data meaningfully.

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